

CLAIMS

What is claimed is:

1. A data recording head for use in conjunction with a data recording medium, comprising:
a body;
a first waveguide supported by the body; and
a second waveguide supported by the body and energy-coupled to the first waveguide.
2. The recording head of claim 1, wherein the first waveguide is configured to couple input radiant energy from an external source.
3. The recording head of claim 2, wherein the first waveguide is configured to end fire couple to the input radiant energy.
4. The recording head of claim 3, wherein the input radiant energy corresponds to a first spot size, and the first waveguide has a first width that is sized to substantially correspond to the first spot size.
5. The recording head of claim 4, wherein the second waveguide is configured to output radiant energy corresponding to a second spot size.
6. The recording head of claim 1 wherein the first waveguide corresponds to an input spot size and the second wavelength corresponds to an output spot size, wherein the input spot size is larger than the output spot size.
7. The recording head of claim 1, wherein the first width is larger than the second width.

8. The recording head of claim 1, further comprising an index matching layer between the first and second waveguides for facilitating mode index matching between the first and second waveguides.
9. The recording head of claim 8, wherein the index matching layer includes at least one of a cladding layer and a diffraction grating.
10. The recording head of claim 1, wherein the second waveguide comprises a solid immersion optical element that is configured to focus radiant energy as an output.
11. The recording head of claim 1, further comprising a write element to effect magnetic data recording, wherein the first and second waveguides are configured relative to the write element to effect heat assisted magnetic recording.
12. A data storage system, comprising:
 - a data recording medium;
 - a radiant energy source;
 - a data recording head, comprising:
 - a body,
 - a first waveguide supported by the body and coupled to the radiant energy source,
 - and
 - a second waveguide supported by the body and energy-coupled with the first waveguide, the second waveguide directing radiant energy to the data recording medium; and
 - an actuator supporting and positioning the data recording head with respect to the data recording medium to effect data recording.
13. The system of claim 12, wherein the first waveguide is configured to end fire couple with the input radiant energy.

14. The system of claim 13, wherein the radiant energy source produces input radiant energy corresponding to a first spot size, wherein the second waveguide is configured to direct output radiant energy having a second spot size, which is smaller than the first spot size.

15. The system of claim 12, wherein the data recording head further comprises at least one of a cladding layer and a diffraction grating between the first and second waveguides.

16. The system of claim 12, wherein the data recording head further comprises a solid immersion optical element that is configured to focus radiant energy onto the data recording medium.

17. The system of claim 12, wherein the data recording medium includes a magnetic data recording medium and wherein the data recording head further comprises a write element to effect magnetic data recording on the magnetic data recording medium, wherein the first and second waveguides are configured relative to the write element and the data recording head is supported and positioned by the actuator relative to the data recording medium to effect heat assisted magnetic recording.

18. A method of data recording, comprising the steps of:
providing a radiant energy source;
providing a data recording head comprising a first waveguide coupled to the radiant energy source, and a second waveguide energy-coupled to the first waveguide and configured to direct radiant energy to a data recording medium;
directing radiant energy at a spot on the data recording medium; and
recording data at the spot where radiant energy has been directed.

19. The method of claim 18, wherein the radiant energy source produces input radiant energy corresponding to a first spot size, wherein the second waveguide is configured to direct output radiant energy having a second spot size, which is smaller than the first spot size.

20. The method of claim 19, wherein the step of recording data includes magnetic data recording.